Citation:

Newman AB, Yanez D, Harris T, Duxbury A, Enright PL, Fried LP; Cardiovascular Study Research Group. Weight change in old age and its association with mortality. *J Am Geriatr Soc.* 2001 Oct;49(10):1309-18.

PubMed ID: 11890489

Study Design:

Longitudinal Observational Cohort Study

Class:

B - Click here for explanation of classification scheme.

Research Design and Implementation Rating:

POSITIVE: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

To identify health and behavior factors associated with changes in measured weight to explain the association between weight change and mortality in community-dwelling older adults.

Inclusion Criteria:

Participants were selected from the Cardiovascular Health Study, through defined samples of Medicare eligible person in four US Communities (NC, CA, MD, PA). All participants were 65 years or older.

Exclusion Criteria:

Participants were excluded if they were:

- living in an institution
- wheelchair-bound in the home or
- actively under treatment for cancer.

Description of Study Protocol:

Recruitment

Recruitment to the original study was not described.

Design: Longitudinal observational cohort study

- Weight was measured at baseline and at the 3 year follow up visit.
- Baseline characteristics were evaluated as predictors of weight loss
- Participants were followed for 1-4 years for mortality study.

Blinding used (if applicable): not specified

Intervention (if applicable): not applicable

Statistical Analysis

- Percent weight change and mean total weight change were assessed using frequencies and plots of distribution.
- Associating factors assessed by analysis of variance or chi square tests with Bonferroni correction for multiple comparisons.
- Linear modeling used for independent factors.
- Cox proportional hazards models for risk assessment.

Data Collection Summary:

Timing of Measurements

Baseline, 3 years, annual follow up for 4 years (only 1 year for African American cohort added later).

Dependent Variables

- Mortality

Independent Variables

- Weight change baseline to 3 years (Loss $\geq$ 5%, Stable within $\pm$ 5%, Gain $\geq$ 5%)

Control Variables

- Demographic and Socioeconomic Factors (age, sex, black or not-black race, income < $12,000, high school graduate or not)
- Behavioral Factors (diet, activity, smoking, alcohol)
- Health Status (diagnoses, medications, activities of daily living, instrumental activities of daily living, mobility, grip strength, cognitive function, depression and life events)
- Interim Acute Health Events (overnight hospitalization, new diagnoses, death of spouse)

Description of Actual Data Sample:

Initial N: 5201 original, plus 687 African American cohort, total 5888 adults

Attrition (final N): 4255 original, 459 cohort

Age: 65 years or older

Ethnicity: Black or Non-Black

Other relevant demographics and anthropometrics: see results section

Location:

- Forsyth County, NC
- Sacramento County, CA
- Washington County, MD
- Pittsburgh, PA

Summary of Results:

Key Findings:

- Weight loss occurred more often than weight gain.
- Weight loss was associated with older age, black race, higher weight, lower waist circumference (all $p < 0.0001$), current smoking ($p<0.005$), stroke ($p = 0.05$), any hospitalization ($p<0.0002$), death of a spouse ($p=0.007$), activities of daily living disability ($p=0.09$), lower grip strength ($p<0.0001$) and slower gait speed ($p = 0.0002$).
- Weight loss of more than 5% was associated with an increased risk of mortality. The age and gender adjusted Hazard Ratio (HR) for weight loss was 2.09 (95% CI = 1.67-2.62).
- Participants with weight loss and low baseline weight had the highest crude mortality rate.

Table of Associations of Weight Change with Mortality (combined cohorts)

Weight Change	N, Dead	Person Years	Rate per 100 person years	Hazard Ratio,(95% CI)	Hazard Ratio, multivariate (95% CI)
3 years					
Loss ≥ 5%	126	2134	5.9	2.41 (1.93-2.99)	1.67 (1.29-2.15)
Stable	220	8864	2.5	1.00 (reference)	
Gain ≥ 5%	42	1799	2.3	0.94 (0.68-1.31)	0.94 (0.65-1.46)
3 years excluding illness					
Loss ≥ 5%	62	1363	4.6	2.22 (1.65-3.00)	1.66 (1.18-2.33)
Stable	137	6632	2.1	1.00 (reference)	
Gain ≥ 5%	27	1347	2.0	0.97 (0.64-1.47)	0.86 (0.54-1.36)

Author Conclusion:

Even a modest decline in body weight is an important marker of risk for mortality in older adults. Weight stability may be the best course of treatment for most older adults.

Reviewer Comments:

Authors note the following:

- *Participants in this study were somewhat healthier than those seen in general practice*
- *Assessment of causes of weight loss includes only factors already assessed in the study*
- *Trajectory of weight changes before the study period were not established, so it cannot be assumed that the change over the 3-year period was linear*

Research Design and Implementation Criteria Checklist: Primary Research

Relevance Questions

1.	Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies)	N/A

2.	Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about?	Yes
3.	Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice?	Yes
4.	Is the intervention or procedure feasible? (NA for some epidemiological studies)	N/A

Validity Questions

1.	**Was the research question clearly stated?**	Yes
1.1.	Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified?	Yes
1.2.	Was (were) the outcome(s) [dependent variable(s)] clearly indicated?	Yes
1.3.	Were the target population and setting specified?	Yes
2.	**Was the selection of study subjects/patients free from bias?**	Yes
2.1.	Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study?	Yes
2.2.	Were criteria applied equally to all study groups?	Yes
2.3.	Were health, demographics, and other characteristics of subjects described?	Yes
2.4.	Were the subjects/patients a representative sample of the relevant population?	Yes
3.	**Were study groups comparable?**	Yes
3.1.	Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT)	Yes
3.2.	Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline?	Yes
3.3.	Were concurrent controls used? (Concurrent preferred over historical controls.)	Yes
3.4.	If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis?	Yes
3.5.	If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.)	N/A
3.6.	If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")?	N/A
4.	**Was method of handling withdrawals described?**	Yes

4.1.	Were follow-up methods described and the same for all groups?	Yes
4.2.	Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.)	Yes
4.3.	Were all enrolled subjects/patients (in the original sample) accounted for?	Yes
4.4.	Were reasons for withdrawals similar across groups?	Yes
4.5.	If diagnostic test, was decision to perform reference test not dependent on results of test under study?	N/A
5.	**Was blinding used to prevent introduction of bias?**	Yes
5.1.	In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate?	N/A
5.2.	Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.)	Yes
5.3.	In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded?	Yes
5.4.	In case control study, was case definition explicit and case ascertainment not influenced by exposure status?	N/A
5.5.	In diagnostic study, were test results blinded to patient history and other test results?	N/A
6.	**Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were interveningfactors described?**	Yes
6.1.	In RCT or other intervention trial, were protocols described for all regimens studied?	N/A
6.2.	In observational study, were interventions, study settings, and clinicians/provider described?	Yes
6.3.	Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect?	Yes
6.4.	Was the amount of exposure and, if relevant, subject/patient compliance measured?	N/A
6.5.	Were co-interventions (e.g., ancillary treatments, other therapies) described?	N/A
6.6.	Were extra or unplanned treatments described?	N/A
6.7.	Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups?	N/A
6.8.	In diagnostic study, were details of test administration and replication sufficient?	N/A
7.	**Were outcomes clearly defined and the measurements valid and reliable?**	Yes
7.1.	Were primary and secondary endpoints described and relevant to the question?	Yes

7.2.	Were nutrition measures appropriate to question and outcomes of concern?	Yes
7.3.	Was the period of follow-up long enough for important outcome(s) to occur?	Yes
7.4.	Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures?	Yes
7.5.	Was the measurement of effect at an appropriate level of precision?	Yes
7.6.	Were other factors accounted for (measured) that could affect outcomes?	Yes
7.7.	Were the measurements conducted consistently across groups?	Yes
8.	**Was the statistical analysis appropriate for the study design and type of outcome indicators?**	Yes
8.1.	Were statistical analyses adequately described and the results reported appropriately?	Yes
8.2.	Were correct statistical tests used and assumptions of test not violated?	Yes
8.3.	Were statistics reported with levels of significance and/or confidence intervals?	Yes
8.4.	Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)?	N/A
8.5.	Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)?	Yes
8.6.	Was clinical significance as well as statistical significance reported?	Yes
8.7.	If negative findings, was a power calculation reported to address type 2 error?	N/A
9.	**Are conclusions supported by results with biases and limitations taken into consideration?**	Yes
9.1.	Is there a discussion of findings?	Yes
9.2.	Are biases and study limitations identified and discussed?	Yes
10.	**Is bias due to study's funding or sponsorship unlikely?**	Yes
10.1.	Were sources of funding and investigators' affiliations described?	Yes
10.2.	Was the study free from apparent conflict of interest?	Yes